

# PATENT COOPERATION TREATY

# PCT

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44bis)

Applicant's or agent's file reference UF-382XC1	<b>FOR FURTHER ACTION</b>		See item 4 below
International application No. PCT/US2004/036266	International filing date ( <i>day/month/year</i> ) 01 November 2004 (01.11.2004)	Priority date ( <i>day/month/year</i> ) 31 October 2003 (31.10.2003)	
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237			
Applicant UNIVERSITY OF FLORIDA RESEARCH FOUNDATION, INC.			

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

- |                                     |              |   |
|-------------------------------------|--------------|---|
| <input checked="" type="checkbox"/> | Box No. I    | Basis of the report   |
| <input type="checkbox"/>            | Box No. II   | Priority  |
| <input type="checkbox"/>            | Box No. III  | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability  |
| <input checked="" type="checkbox"/> | Box No. IV   | Lack of unity of invention  |
| <input checked="" type="checkbox"/> | Box No. V    | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| <input type="checkbox"/>            | Box No. VI   | Certain documents cited   |
| <input type="checkbox"/>            | Box No. VII  | Certain defects in the international application  |
| <input type="checkbox"/>            | Box No. VIII | Certain observations on the international application   |

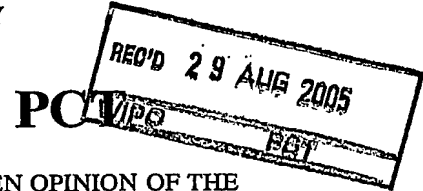
4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44bis.3(c) and 93bis.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44bis .2).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland  Facsimile No. +41 22 740 14 35	Date of issuance of this report 01 May 2006 (01.05.2006)  Authorized officer  <div style="text-align: center; font-weight: bold;">Dorothee Mülhausen</div>  Telephone No. +41 22 338 87 40
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# PATENT COOPERATION TREATY

From the  
INTERNATIONAL SEARCHING AUTHORITY

To:  
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## WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Applicant's or agent's file reference <b>UF-382XC1</b>		Date of mailing (day/month/year) <b>26 AUG 2005</b>
FOR FURTHER ACTION See paragraph 2 below		
International application No. <b>PCT/US04/36266</b>	International filing date (day/month/year) <b>01 November 2004 (01.11.2004)</b>	Priority date (day/month/year) <b>31 October 2003 (31.10.2003)</b>
International Patent Classification (IPC) or both national classification and IPC <b>IPC(7): A01H 5/00, 5/10, 1/00, 1/02, 1/06; C12P 19/00 and US Cl.: 800/263, 270, 274, 275, 284, 303, 320.1</b>		
Applicant <b>UNIVERSITY OF FLORIDA RESEARCH FOUNDATION, INC.</b>		

**1. This opinion contains indications relating to the following items:**

- ☒ Box No. I      Basis of the opinion
- ☐ Box No. II      Priority
- ☐ Box No. III      Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☒ Box No. IV      Lack of unity of invention
- ☒ Box No. V      Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI      Certain documents cited
- ☐ Box No. VII      Certain defects in the international application
- ☐ Box No. VIII      Certain observations on the international application

**2. FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

**3. For further details, see notes to Form PCT/ISA/220.**

Name and mailing address of the ISA/ US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (703) 305-3230	Authorized officer <i>Mary J. Fox</i> David T. Fox Telephone No. 571-272-1600
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**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US04/36266

**Box No. I Basis of this opinion**

1. With regard to the language, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ This opinion has been established on the basis of a translation from the original language into the following language \_\_\_\_\_, which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).

2. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

a. type of material

☐ a sequence listing

☐ table(s) related to the sequence listing

b. format of material

☐ in written format

☐ in computer readable form

c. time of filing/furnishing

☐ contained in international application as filed.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US04/36266

**Box No. IV Lack of unity of invention**

1. ☒ In response to the invitation (Form PCT/ISA/206) to pay additional fees the applicant has:
- ☐ paid additional fees
- ☐ paid additional fees under protest
- ☒ not paid additional fees
2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rule 13.1, 13.2 and 13.3 is
- ☐ complied with
- ☒ not complied with for the following reasons:
- See the lack of unity section of the International Search Report (Form PCT/ISA/210)

4. Consequently, this opinion has been established in respect of the following parts of the international application:
- ☐ all parts.
- ☒ the parts relating to claims Nos. 1-17

**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

International application No.  
PCT/US04/36266

**Box No. V Reasoned statement under Rule 43 bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

**1. Statement**

Novelty (N)	Claims <u>1-17</u>	YES
	Claims <u>NONE</u>	NO
Inventive step (IS)	Claims <u>NONE</u>	YES
	Claims <u>1-17</u>	NO
Industrial applicability (IA)	Claims <u>1-17</u>	YES
	Claims <u>NONE</u>	NO

**2. Citations and explanations:**

Claims 1-17 meet the criteria set out in PCT Article 33(4), and thus have industrial applicability because the subject matter claimed can be made or used in industry.

Claims 1-17 lack an inventive step under PCT Article 33(3) as being obvious over Hannah et al in view of Chang et al, further in view of Vasil et al, further in view of Marshall et al, further in view of Robertson et al.

Hannah et al teach a recessive loss-of-function sh2 mutant which confers sweetness to sweet corn, and also teach the sh2-i mutant allele which confers increased sweetness but does not diminish seed germination, wherein the sh2-i allele may be introgressed into other sweet corn genotypes (see, e.g., column 2, line 61 through column 3; column 8, lines 30-50).

Hannah et al do not teach a dominant loss-of-function sh2 mutant, the introgression with genotypes containing a sugary mutant, or the use of seed blends with male sterility.

Chang et al teach the use of homologous cosuppression or antisense RNA to cause loss-of-function mutants in the sh2 and su genes, in order to increase sweetness of sweet corn; the advantages of multiple mutants for conferring sweetness; and the use of male sterility to control pollination for the introgression of desired traits in corn (see, e.g., column 2, lines 7-39; column 4, lines 23-35; column 5, lines 17-23; column 6, lines 1-14 and 39-43; column 7, lines 49-62; column 19, line 15 through column 20, line 5; column 21 through column 22, line 8; Figures 4a-4d).

Vasil et al teach the use of the Sh1 first intron for enhancing foreign gene expression 100-fold (see, e.g., column 2, lines 52-59; column 7, lines 35-66; column 9, lines 1-5; column 10, lines 38-67; claims 1,18-21 and 23).

Marshall et al teach the use of seed blends of a desired corn genotype mixed with male sterile seeds, wherein the male sterile seeds are in the majority (see, e.g., column 1, line 65 through column 2, line 8).

Robertson et al teach the desirability of dominant mutants of carbohydrate synthesis genes for ease of breeding, and also teach the use of male sterility to control pollinations for the introgression of these mutants (see, e.g., column 1, line 62 through column 2, line 9; column 2, lines 23-29 and 61-67; column 5, lines 26-29 and 49-55; column 9, lines 24-32).

It would have been obvious to one of ordinary skill in the art to utilize the sh2-iiii mutant for conferring increased sweetness as taught by Hannah et al, and to modify that method by incorporating a dominant sh2-iiii mutant via antisense suppression or sense cosuppression of the native Sh2 gene as taught by Chang et al, coupled with expression of the sh2-iii allele under the control of the Sh1 first intron as taught by Vasil et al, to obtain a dominant-loss-of function mutant, given the desirability of such mutants as taught by Robertson et al. It would have been further obvious to incorporate multiple mutants and seed blends with predominantly male sterile seeds, given the advantages of each as taught by Marshall et al, Robertson et al, and Chang et al.